

Cameron Guy Robinson Geddes

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Education and Awards

Ph.D., Physics, University of California Berkeley, Berkeley CA, Spring 2005.

BA, Swarthmore College, Swarthmore PA, Spring 1997. High honors, Physics major, Polisci minor.

Honors and Fellowships

- Am. Phys. Soc. Rosenbluth award for outstanding doctoral dissertation, 2006.
- Outstanding Performance Award, LBNL, 2005.
- Hertz Thesis prize for outstanding graduate dissertation, 2005.
- Hertz Foundation Fellowship, 2000-2004.
- DoD NDSEG fellowship, 1999.
- Fellowships won but not accepted due to conflicts: DoE Fusion Energy Sciences, Princeton/Hertz, UC Dept. of Physics, MIT Compton, NSF honorable mention, 1999.
- Am. Phys. Soc. Apker award for best undergraduate thesis in physics, 1997.
- Ellmore prize for outstanding work in physics at Swarthmore, 1997.
- Phi Beta Kappa, national honors society, 1997.
- DOE National Undergraduate Fellowship in Plasma Physics, 1995.
- Associate Member, Sigma Xi scientific research honors society, 1994.

Research Experience

- Physicist, LOASIS program, LBNL (4/05-Current). Experiments and simulations underway on controlled injection and guiding optimization for reproducible electron bunches from laser wakefield accelerators. INCITE grant for large-scale simulations. Developing ultrafast X-ray source based on radiation produced by accelerating electrons. Rebuilt laser amplifier to increase power and mode quality. Supervisor: Wim Leemans.
- Ph.D. Student, LOASIS program, LBNL (6/00-3/05). Configured laser to pre-form and shape a target plasma (or channel), allowing guiding of relativistically intense laser pulses for the first time. This produced the first high quality electron beams (10^9 electrons in percent energy spread) from a high gradient laser wakefield accelerator. Conducted particle-in-cell simulations showing how guiding resulted in high quality electron beams. Characterized acceleration with various gas jets and laser pulse shapes, and with plasma pre-ionization. Designed and built gas jet targets and a characterization interferometer with software. Developed a network PC control system for remote operation of the experiment and analysis software. Supervisor: Wim Leemans.
- Physicist, plasma group, LLNL (11/97 – 8/99). Constructed and used a Thomson scatter imaging system which measured ion waves from Brillouin scattering of lasers used in inertial confinement fusion, as well as products of wave decays which may limit Raman scattering. Built two backscattered light diagnostics for the Omega laser and used them for crossed-beam and hohlraum plasma experiments (see below). Built an interferometry system to metrologize cryogenic ICF targets. Supervisor: Peter Young.
- Physicist Contractor, Polymath Research (9/99 - 5/00). Analyzed crossed-beam experiments using backscatter diagnostics I developed at LLNL. Wrote data analysis and processing codes. Supervisor: Bedros Afeyan.
- B.A. thesis research, Swarthmore College (6/96-6/97). Built and used arrays of magnetic probes to study the equilibrium states of spheromak plasmas and to compare them to modeling. Devised and implemented a precision probe calibration system. Wrote a grad Shafranov solver in Matlab and a fitting code to compare model equilibria with experiments, as well as a code to infer current and pressure profiles from magnetic data. Characterized equilibria in two flux conservers and various start up conditions. Supervisor: Michael Brown.
- Assoc. Scientist, LBNL (9/95-12/95). Modeled current wave-forms and carrier profiles in silicon microstrip detectors. Modified an existing C code and developed a new model based on a commercial semiconductor modeling program. Furthered understanding of the effects of incident particle position, energy, and angle, as well as device geometry, radiation damage, and magnetic field. Supervisor: James Siegrist.
- Research assistant, U of Wisconsin/PPPL (6/95-9/95). Built a triple Langmuir probe to sense plasma density and temperature on the MEDUSA low-aspect Tokamak. Tested plasma performance; participated in running the tokamak and developing control software, power systems, and magnetic probes. Supervisor: Ray Fonck.
- Research assistant, Swarthmore College (6/93-6/95). Characterized output of Erbium doped fibers and leaky slab waveguides. Built temperature controller and instrument control software. Supervisor: Lynne Molter.

Teaching and Other Experience

- Experience working with and mentoring students in the laboratory/research setting.
- TA for honors intro. Electricity & Magnetism (Fall 00), mechanics lab (Fall 96), problem sessions (Spring 96)
- Programming in C, MATLAB, LabVIEW, IDL, BASIC, AVS, MEDICI, Lisp and Mathematica for data acquisition and processing, process and instrument control, modeling, and general use on Mac/Win/UNIX.

Selected Papers

Full listing at <http://geddes.lbl.gov/>

- C. G. R. Geddes, Cs. Toth, J. van Tilborg, E. Esarey, C. B. Schroeder, J. Cary, W. P. Leemans, "Guiding of Relativistic Laser Pulses by Preformed Plasma Channels," Phys. Rev. Lett., vol. 95 no. 14, 2005, pp 145002-1 to 4.
- C. G. R. Geddes, Cs. Toth, J. van Tilborg, E. Esarey, C. B. Schroeder, D. Bruhwiler, C. Nieter, J. Cary, W. P. Leemans, "Production of high quality electron bunches by dephasing and beam loading in channeled and unchanneled laser plasma accelerators," Physics of Plasmas, vol. 12, 2005, pp 056709-1 to 10.
- C. G. R. Geddes, Cs. Toth, J. van Tilborg, E. Esarey, C. B. Schroeder, D. Bruhwiler, C. Nieter, J. Cary, W. P. Leemans, "High-quality electron beams from a laser wakefield accelerator using plasma-channel guiding," Nature, Sept 30 2004, pp. 538-41.
- C.G.R. Geddes, Cs. Toth, J. Van Tilborg, E. Esarey, C.B. Schroeder, D. Bruhwiler, J. Cary, W.P. Leemans, "Laser Guiding at Relativistic Intensities and Wakefield Particle Acceleration in Plasma Channels," Proceedings of the Advanced Accelerator Concepts Workshop, Brookhaven NY, June 2004, pp. 521-7.
- W.P. Leemans, P. Catravas, E. Esarey, C.G.R. Geddes, C. Toth, R. Trines, C.B. Schroeder, B.A. Shadwick, J. van Tilborg, J. Faure, "Electron-yield enhancement in a Laser-Wakefield accelerator driven by asymmetric laser pulses," Physical Review Letters, vol.89, no.17, 21 Oct. 2002, pp.174802/1-4.
- C.G.R. Geddes, P.E. Catravas, J. Faure, C. Toth, J. VanTilborg, W.P. Leemans, "Accelerator optimization using a network control and acquisition system," AIP Conference Proceedings, no.647- Advanced Accelerator Conference, 2002, pp.796-801.
- C.G.R. Geddes, R.K. Kirkwood, S.H. Glenzer, K.G. Estabrook, C. Joshi, K.B. Wharton, "Observation of ion wave decay products of Langmuir waves generated by stimulated Raman scattering in ignition scale plasmas," Physics of Plasmas, vol.10, no.8, August 2003, pp.3422-25.
- C.G.R. Geddes, T.W. Kornack, M.R. Brown, "Scaling studies of spheromak formation and equilibrium," Physics of Plasmas, vol.5, no.4, April 1998, pp.1027-34.
- C.G.R. Geddes, A.U. Tran, G. Chong, L.A. Molter, M. Dutta, "Nonlinear Optical Slab Waveguide Devices in AlGaAs/GaAs," Proceedings of the Conference on Lasers and Electro Optics, Baltimore MD, 1995, pp.100-1.

Selected Presentations

- C.G.R. Geddes, "Mono Energetic Beams from Laser Plasma Interactions," Particle Accelerator Conference, Knoxville TN, May 2005 (*Invited Talk*).
- C.G.R. Geddes, "High quality electron bunches from a plasma channel guided laser wakefield accelerator", Japan-US Workshop on High Irradiance Lasers, Osaka Japan, December 2004 (*Invited Talk*).
- C.G.R. Geddes, "High quality electron bunches from a plasma channel guided laser wakefield accelerator," APS Division of Plasma Physics, Savannah GA, November 2004 (*Invited Talk*).
- C.G.R. Geddes, "Modeling of OASIS experiments on laser plasma acceleration," Department of Energy Scientific Discovery through Advanced Computing meeting, Fermilab, August 2004.
- C.G.R. Geddes, "Nuclear activation experiments using laser wakefield accelerators," Workshop on Targetry and Target Chemistry (WTTC), Madison WI, August 2004 (*Invited Talk*).
- C.G.R. Geddes, "Laser Guiding At Relativistic Intensities and Wake Field Particle Acceleration in Plasma Channels," Advanced Accelerator Workshop, June 2004 (*Invited Talk*).
- Geddes CGR, Sanchez J, Collins G, McKenty P. "Interferometric Characterization of Hydrogen Ice Layers in NIF Scale Targets," APS Division of Plasma Physics Meeting, New Orleans, Nov 1998.
- C.G.R. Geddes, "Spheromak Equilibrium Studies on the Swarthmore Spheromak Experiment," APS Joint Meeting, Columbus OH, April 1998 (*Invited Talk*).